

CLAIMS

1. An optical element for reflecting or transmitting an incident light, said optical element comprising a periodic structure in which refractive
5 index is distributed periodically and a deforming portion which deforms by external action, wherein said deforming portion is integrally arranged with said periodic structure along the periodic direction of said periodic structure, and is so constructed as
10 to change the periodicity of said periodic structure by deforming in the periodic direction of said periodic structure.

2. The optical element according to claim 1,
15 wherein said change in the periodicity is that in any one of the period, phase, duty and orientation of said periodic structure or in the combination thereof.

3. The optical element according to claim 1,
20 wherein said deforming portion is positioned outside a path of reflecting or transmitting light of said optical element.

4. The optical element according to claim 1,
25 wherein said deforming portion includes a member integrally joined to said periodic structure, and said member deforms in the direction parallel to the

joining plane of said member with said periodic structure.

5. The optical element according to claim 1,
5 wherein said deforming portion includes a member for supporting said periodic structure, and said member deforms in the direction parallel to the plane of said member supporting said periodic structure.

10 6. The optical element according to claim 5, wherein said member supporting the periodic structure is the same as a member constituting said periodic structure.

15 7. The optical element according to claim 1, wherein said deforming portion elongates and contracts in at least one direction.

8. The optical element according to claim 1,
20 wherein said deforming portion causes shear deformation in at least one direction.

9. The optical element according to claim 1,
wherein said deforming portion is constituted of a
25 piezoelectric element.

10. The optical element according to claim 9,

wherein said deforming portion includes a pair of electrodes, and said pair of electrodes are so arranged as to provide said deforming portion with an electric field substantially parallel to the periodic
5 direction of said periodic structure.

11. The optical element according to claim 9, wherein said deforming portion includes a pair of electrodes, and said pair of electrodes are so
10 arranged as to provide said deforming portion with an electric field substantially perpendicular to the periodic direction of said periodic structure.

12. The optical element according to claim 1,
15 wherein said periodic structure is of a multi-dimensional photonic crystal.

13. The optical element according to claim 12, wherein said periodic structure is of a two-
20 dimensional photonic crystal, and is composed of a portion having a two-dimensional periodicity and a support portion for supporting the portion having the two-dimensional periodicity.

25 14. The optical element according to claim 12, wherein said periodic structure is of a two-dimensional photonic crystal, and is composed solely

of a portion having a two-dimensional periodicity.

15. A mirror comprising the optical element according to claim 1, and means for switching
5 reflective and transmissive properties of said periodic structure alternatively by providing said deforming portion of said optical element with external force.

10 16. The optical deflector comprising the optical element according to claim 1, and means for changing a light-propagating direction of said periodic structure by providing said deforming portion of said optical element with periodic
15 external force.

17. A control method for an optical element having a periodic structure in which refractive index is distributed periodically, comprising the steps of
20 arranging a deforming portion which deforms by external action integrally with said periodic structure along the periodic direction of said periodic structure, and changing the periodicity of said periodic structure by causing deformation in the
25 periodic direction of said periodic structure.